AMENDMENTS TO THE SPECIFICATION

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MAGNETIC THIN FILM AND PRODUCTION METHOD THEREFOR

CONTINUATION DATA

This is a continuation of U.S. Patent Application No. 09/268,948, filed on March 16, 1999, which is a divisional of Patent Application No. 08/765,836 filed on January 14, 1997, the disclosure of each of which is herein explicitly incorporated by reference.

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That is to say, the magnetic thin film of the present invention is ~~characterized in comprising~~ composed of an iron nitride thin film which is formed on a substrate by means of an opposed-target DC sputtering method employing reactive sputtering with N_2 gas.

Furthermore, the magnetic thin film manufacturing method in accordance with the present invention is a manufacturing method for iron nitride thin films which employs an opposed-target DC sputtering method, characterized in that an iron nitride thin film is formed on a substrate by introducing Ar and N_2 gases into a film formation chamber, and applying DC power to an iron target within the Ar and N_2 gas atmosphere.

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Furthermore, it is preferable that the ~~election~~ electron ~~temperature~~ voltage during formation of the iron nitride thin film be within a range of 0.01 - eV, and that the electron density be within a range of 1×10^{9} - 1×10^{10} cm^{-3}.

By means of the present invention, it is possible to rapidly and stably form an iron nitride thin film having an extremely large saturation Ms, by means of employing an opposed-target DC sputtering method. Additionally, by means of setting the electron ~~temperature~~ voltage and electron density during film formation to within ranges of, respectively, 0.01 - 1 eV and 1×10^{9} - 1×10^{10} cm^{-3}, within a chamber, and was then allowed to cool to room temperature.

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First, an iron base layer having a thickness of 50Å was formed in a Ar atmosphere (at a film formation rate of 33Å/min), and on this, an iron nitride thin film having a thickness fo 3000Å was formed in a Ar and N_2 gas atmosphere, at a film formation rate of 200Å/min. Film formation was conducted under conditions such that the electron ~~temperature Te~~ voltage was equal to 0.3 eV and the electron density Ne was equal to 1 x 10^{10} cm^{-3}; these were determined on the basis of plasma diagnostic results.